

# PATENT ABSTRACTS OF JAPAN

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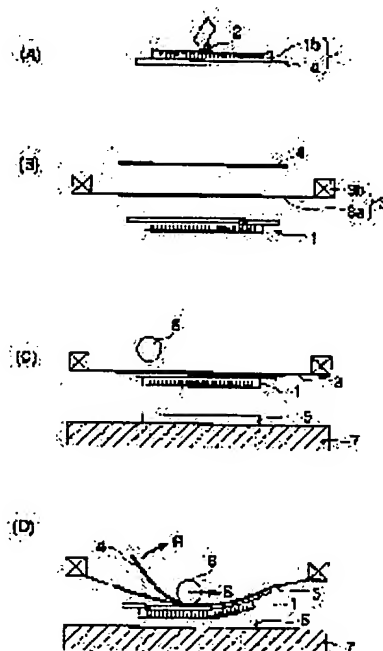
## (54) METHOD AND APPARATUS FOR TRANSFERRING THREE- DIMENSIONAL STRUCTURE

### (57)Abstract:

PROBLEM TO BE SOLVED: To smoothly transfer a three-dimensional structure in a good accuracy without considerable influence of the adhesive strength and the mold releasability of a structural material by using a sheet-like transfer intaglio, temporarily fixing the intaglio to a support, press bonding the material together with the intaglio to a base by utilizing the support, then releasing the temporary fixing, and thereafter releasing the intaglio so as to peel it from the base.

SOLUTION: The method for transferring a three-dimensional structure comprises the steps of preparing a paste-like structural material for developing adhesive properties or adhesiveness after curing or semicuring, filling the material in recesses of a sheet-like transfer intaglio having a plurality of arranged recesses, coating with the material, curing or semicuring the material, temporarily fixing the intaglio to a support, aligning the intaglio with a base, then press bonding the material of the state having the properties or the adhesiveness to the base together with the intaglio, releasing the temporary fixing of the intaglio by the support after

立体構造転写方法の実施例の工程図に示す概略図



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CLAIMS

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[Claim(s)]

[Claim 1] The structural material of the shape of a paste which adhesiveness or an adhesive property discovers after hardening or semi-hardening is prepared. Or semi-hardening is carried out. the crevice of the sheet-like imprint intaglio with which two or more crevices were arranged -- the structural material of the shape of said paste -- restoration spreading -- carrying out -- hardening -- After carrying out temporary immobilization of the imprint intaglio at support and performing alignment of an imprint intaglio and a substrate, The spacial configuration object imprint approach characterized by imprinting a spacial configuration object on a substrate by sticking the structural material of the condition with adhesiveness or an adhesive property to a substrate by pressure with an imprint intaglio, canceling temporary immobilization of the imprint intaglio by the support after sticking by pressure, and removing an imprint intaglio from a substrate.

[Claim 2] The spacial configuration object imprint approach according to claim 1 that an imprint intaglio becomes the continuation sheet rolled in the shape of a roll from the roll sheet with which the crevice was arranged.

[Claim 3] The spacial configuration object imprint approach according to claim 2 that a roll sheet has a sprocket hole for conveyance to both ends, support has a pin according to this sprocket hole, and temporary immobilization of the imprint intaglio is carried out by it at the position of support.

[Claim 4] The spacial configuration object imprint approach according to claim 1 that support consists of the imprint version with which the plate which a screen is stretched in the frame arranged horizontally and has flexibility on the screen was supported.

[Claim 5] The spacial configuration object imprint approach according to claim 1 that support possesses the adsorption device for carrying out temporary immobilization of the imprint intaglio, and consists of the electromagnetic chuck, the vacuum chuck, or the electrostatic chuck into which the field the adsorption device carries out [ the field ] a chuck was divided, and discharge of temporary immobilization of an imprint intaglio is performed one by one by turning off the switch of the adsorption device of a part canceling.

[Claim 6] The spacial configuration object imprint approach according to claim 1 that support consists of a clamp device which adds a tension and supports an imprint intaglio by holding the both ends of an imprint intaglio and pulling from both sides.

[Claim 7] The spacial configuration object imprint approach according to claim 1 performed by moving and rotating an alignment table horizontally so that the alignment mark of an imprint intaglio and a substrate may be in agreement after the alignment of an imprint intaglio and a substrate prepares two or more alignment marks in the imprint intaglio and the substrate beforehand, laying a substrate in the alignment table in which horizontal migration and rotation are possible and carrying out temporary immobilization of the imprint intaglio at support.

[Claim 8] The spacial configuration object imprint approach according to claim 1 that discharge of sticking by pressure to the substrate of a structural material and temporary immobilization of an imprint intaglio is continuously performed to coincidence from the end of an imprint intaglio to the other end.

[Claim 9] The spacial configuration object imprint approach according to claim 1 performed by canceling temporary immobilization of an imprint intaglio after the whole imprint intaglio sticks on a substrate and discharge of sticking by pressure to the substrate of a structural material and temporary immobilization of an imprint intaglio is stuck.

[Claim 10] The substrate assembly which has the spacial configuration object formed by the approach of any one publication of claim 1-9.

[Claim 11] The plasma display panel manufactured using the substrate assembly according to claim 10.

[Claim 12] The conveyance device in which the sheet-like imprint intaglio with which two or more crevices were arranged and the crevice was filled up with the structural material with adhesiveness or an adhesive property is conveyed, The support for carrying out temporary immobilization of the imprint intaglio conveyed according to the conveyance device, The stage which can perform alignment of an imprint intaglio and a substrate by laying a substrate and moving the location of this substrate in parallel to support, The roll press device which sticks the structural material of the condition with adhesiveness or an adhesive property to a substrate by pressure with an imprint intaglio by pressing an imprint intaglio with a roller from a tooth back after the alignment of an imprint intaglio and a substrate, Spacial configuration object imprint equipment which comes to have the discharge device in which temporary immobilization of an imprint intaglio is canceled after press of a roll press device, and the removal device in which an imprint intaglio is removed from a substrate.

[Claim 13] Spacial configuration object imprint equipment according to claim 12 with which an imprint intaglio becomes the continuation sheet rolled in the shape of a roll from the roll sheet with which the intaglio was arranged.

[Claim 14] Spacial configuration object imprint equipment according to claim 12 which comes to have a pin according to a sprocket hole for support to carry out temporary immobilization of the imprint intaglio at a position while a roll sheet has a sprocket hole for conveyance to both ends and a conveyance device has a sprocket for roll sheet conveyance.

[Claim 15] Spacial configuration object imprint equipment according to claim 12 with which support consists of an electromagnetic chuck with the adsorption device able to provide the adsorption device for carrying out temporary immobilization of the imprint intaglio, and to carry out sequential discharge of the temporary immobilization of an imprint intaglio by turning off partially the switch of the chuck field divided and prepared, a vacuum chuck, or an electrostatic chuck.

[Claim 16] Spacial configuration object imprint equipment according to claim 12 which an imprint intaglio and a substrate have an alignment mark for performing both alignment, and comes to have the alignment table [ a stage is able to lay a substrate and ] which can move and rotate a substrate horizontally so that the alignment mark of an imprint intaglio and a substrate may be in agreement after temporary immobilization of the imprint intaglio is carried out at support.

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[Translation done.]

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the spacial configuration object imprint approach for manufacturing the substrate which has a spacial configuration object like a septum (rib) like a plasma display panel (PDP) in more detail in the viewing area between the glass substrate by the side of a front face, and the glass substrate by the side of a tooth back about the spacial configuration object imprint approach and its equipment, and its equipment.

[0002]

[Description of the Prior Art] As a substrate which has a spacial configuration object, the PDP substrate which has a septum is mentioned as an example, and is explained. PDP is the display panel of the self-luminescence mold in which discharge space was formed inside, by preparing very small spacing, carrying out opposite arrangement of the substrate (usually glass substrate) of a pair, and closing a perimeter.

[0003] Generally, the septum (spacial configuration object) with a height of about 100-200 micrometers is periodically formed in this PDP so that discharge space may be divided. For example, the septum of the shape of the shape of a plane view straight line and a grid is formed on the substrate with which the data electrode (it is also called an address electrode) was arranged by the field discharge mold PDP suitable for the color display by the fluorescent substance. Interference of discharge and the cross talk of a color are prevented by this septum.

[0004] The method of producing a PDP substrate with above-mentioned structure has the common process which forms a data electrode pattern on a glass substrate, and forms a septum so that the electrode pattern may be adjusted (alignment). Various approaches are proposed and enforced as the formation approach of the septum in this case. The laminating print processes which repeat screen-stencil and carry out laminating printing of the septum as a typical thing, The sandblasting method which sprays and cuts a blasting particle, the embedding method for embedding a septum ingredient in the crevice of a photosensitive ingredient layer, and removing a photosensitive ingredient layer, FOTORISO which uses a photosensitive ingredient for a septum -- there are law, a replica method which imprints a septum to a substrate using the matrix for an imprint (imprint intaglio), and the replica method attracts attention as an approach low cost-ization is most expectable also in it.

[0005] A replica method is the approach of forming a septum using the imprint intaglio with which the slot or crevice for forming a septum as mentioned above was formed. As a procedure, after filling up the crevice of an imprint intaglio with a septum ingredient, a septum is formed by imprinting it to a substrate.

[0006] Various kinds of technique is proposed as the imprint technique of the septum ingredient used with this replica method. For example, after filling up with a septum ingredient an intaglio mold which is indicated by JP,9-134676,A, the technique of carrying out imprint formation of the septum ingredient with a heat press at a substrate etc. is known. However, when heat-treating, in case the solid composition pattern of the letter of a crossover is piled up especially, very complicated count will be needed [ it is

necessary to take all expansion of a mold, a septum ingredient, and a substrate etc. into consideration and ]. In order to avoid this problem, an imprint at a room temperature is desirable in principle. [0007] Moreover, the Taira version imprint flat-surface mold release (it releases from mold, after imprinting the whole) method which imprints with a plane intaglio and is released from mold as [ plane ] as an art of the mold release used with a replica method, and the curved-surface imprint (it releases from mold immediately after imprint) method of the roll use released from mold while imprinting with the intaglio of the shape of a curved surface established along the roller side are learned.

[0008]

[Problem(s) to be Solved by the Invention] The technique of the adhesion imprint which used an adhesive ingredient which is indicated by JP,10-326560,A as an example performed at a room temperature among the arts of an imprint used with a replica method is known. Since the technique of this adhesion imprint can perform imprint formation at a room temperature, it has the merit which can realize the good imprint of dimensional accuracy.

[0009] However, when imprinting a septum using this technique by the above-mentioned Taira version imprint flat-surface mold release method, in order to perform alignment with the septum which carries out imprint formation with the electrode formed on the substrate Since it is necessary to imprint by maintaining a substrate and an imprint intaglio in parallel, mold release of the imprint intaglio after an imprint must also be inevitably performed perpendicularly to a substrate. This sake, If the remarkable force is needed for mold release of an imprint intaglio and adhesion reinforcement of an imprint ingredient and a substrate and reinforcement of the imprint ingredient itself are not enlarged enough, the problem which the structure which should be imprinted at the time of an imprint can break, or cannot be imprinted arises.

[0010] Moreover, since it is necessary to fix so that an imprint intaglio may be twisted around a roller, and to perform imprint and mold release to coincidence when imprinting a septum by the above-mentioned curved-surface imprint method using the technique of this adhesion imprint, unless the adhesion reinforcement of an imprint ingredient and a substrate is fully large compared with the adhesion reinforcement of an imprint intaglio and an imprint ingredient, therefore, Siwa will keep in an imprint object, or a roller will stop. This problem serves as a serious failure by leaps and bounds as the area which carries out imprint formation becomes large.

[0011] This invention was made in consideration of such a situation, and a sheet-like imprint intaglio is used for it. By carrying out temporary immobilization of this imprint intaglio at support, canceling temporary immobilization for a structural material (imprint ingredient) after being stuck to a substrate by pressure with an imprint intaglio using support, and exfoliating so that Peel of the sheet-like imprint intaglio may be carried out from a substrate after that The spacial configuration object imprint approach which enabled it to imprint smoothly in a good precision, and its equipment are offered without being influenced so much by the adhesion reinforcement and the mold-release characteristic of a structural material.

[0012]

[Means for Solving the Problem] This invention prepares the structural material of the shape of a paste which adhesiveness or an adhesive property discovers after hardening or semi-hardening. Or semi-hardening is carried out. the crevice of the sheet-like imprint intaglio with which two or more crevices were arranged -- the structural material of the shape of said paste -- restoration spreading -- carrying out -- hardening -- After carrying out temporary immobilization of the imprint intaglio at support and performing alignment of an imprint intaglio and a substrate, It is the spacial configuration object imprint approach characterized by imprinting a spacial configuration object on a substrate by sticking the structural material of the condition with adhesiveness or an adhesive property to a substrate by pressure with an imprint intaglio, canceling temporary immobilization of the imprint intaglio by the support after sticking by pressure, and removing an imprint intaglio from a substrate.

[0013] That is, in this invention, after carrying out temporary immobilization of the sheet-like imprint intaglio with which restoration spreading of the structural material was carried out at support, imprint

formation of a spacial configuration object is carried out to a substrate by performing alignment of the relative position of an imprint intaglio and a substrate, sticking a structural material to a substrate by pressure with an imprint intaglio, making an imprint intaglio release from support by discharge of temporary immobilization, and exfoliating so that Peel of the sheet-like imprint intaglio may be carried out from a substrate after that.

[0014] Since it enabled it to perform Peel exfoliation which the process of an imprint is divided into two processes of a sticking-by-pressure (attachment) process and a mold release process, and the force with the mold release impossible for does not join at a mold release process according to this invention, it is eased sharply and the imprint formation of a spacial configuration object with a high precision in a large area field of the limit about the adhesion reinforcement of a structural material, or mechanical strength and extent of the mold-release characteristic of an imprint intaglio is attained.

[0015]

[Embodiment of the Invention] The spacial configuration object imprint approach of this invention and its equipment can mainly be used suitable for manufacture of PDP.

[0016] In this invention, a spacial configuration object means the three-dimensional structure of all configurations which can be fabricated by mold push. For example, in applying this invention to manufacture of PDP, the structure like a septum is equivalent to a spacial configuration object.

[0017] By the plane, in a freely turnable base material, the sheet-like imprint intaglio with which two or more crevices (or slot) were arranged means that in which the matrix of the septum was formed, if for example, a spacial configuration object is a septum. A base material and a matrix may be one and a matrix may be attached in a base material. Each of well-known ingredients and production approaches can be used especially for the ingredient and the production approach of this imprint intaglio, without being limited. It is desirable to use the imprint intaglio which consists of a silicone rubber system ingredient with a comparatively sufficient mold-release characteristic rather than a ceramic system ingredient as an ingredient of an imprint intaglio at this invention. Moreover, what has a certain amount of flexibility as a base material is desirable.

[0018] When mass production is taken into consideration, as for an imprint intaglio, it is desirable to use for the continuation sheet rolled in the shape of a roll as a roll sheet with which the intaglio was arranged. In this case, it is good for the both ends of a roll sheet to prepare the sprocket hole for conveyance.

[0019] Generally the structural material of the shape of a paste by which restoration spreading was carried out is called an imprint ingredient to the crevice of a sheet-like imprint intaglio, and a septum ingredient is meant when a spacial configuration object is [ for example, ] the above-mentioned septum. Each well-known ingredient can be used especially as this septum ingredient, without being limited. For example, the septum ingredient of the shape of a paste which consists of the filler of low-melting-glass powder and an inorganic substance, binder resin, and an organic solvent can be used. extent to which after restoration spreading of a paste-like septum ingredient can discover adhesiveness or an adhesive property -- a septum ingredient -- hardening -- or semi-hardening is carried out. Addition rates, such as a non-subtlety particle, a thickener, an organic solvent, a plasticizer, and a suspending agent, can adjust the viscosity of a septum ingredient suitably. In addition, in order to raise the adhesiveness on hardening or the front face of a paste after carrying out semi-hardening, it is desirable to use the low (about  $T_g = -60 \sim -20$  degree C) thing of a glass transition point for the binder resin to knead.

[0020] Although you may be which gestalt of the shape of a plane or a roll, when imprinting a structural material to flat-surface substrates, such as glass, and supported, as for the support which carries out temporary immobilization of the imprint intaglio, it is desirable that it is a plane. Moreover, when it is a plane, it is desirable that it is what has flexibility. Such support can consist of imprint versions with which the plate which a screen is stretched in the frame arranged horizontally, for example, and has flexibility on the screen was supported. PURIARAIMENTO [ thing / it can be desirable to prepare the pin according to a sprocket hole also in a support side, and / an imprint intaglio / the position which is support ] thereby when an imprint intaglio is the roll sheet which has a sprocket hole.

[0021] In this invention, after sticking a structural material to a substrate by pressure with an imprint

intaglio, temporary immobilization just fixes an imprint intaglio to support temporarily so that an imprint intaglio can be released from support.

[0022] Temporary immobilization can be performed by preparing adsorption devices, such as a magnet, an electrostatic chuck, and a vacuum chuck, in support. When using a magnet, the support plate which has the magnetism of a griddle, the Invar plate, etc. is beforehand formed in the tooth back of an imprint intaglio, and temporary immobilization can be performed by adsorbing an imprint intaglio through support at support with a sheet-like flexible magnet.

[0023] When applying a magnet to an adsorption device, it is not necessary to necessarily use a permanent magnet, and an electromagnet may be used. What is necessary is to arrange an electromagnet to a support side and just to deal with making the component of an imprint intaglio contain the fine particles which apply the coating which fixes the support plate which has magnetism in an imprint intaglio, or has magnetism, or have magnetism etc., when using an electromagnet.

[0024] When imprint intaglios are resin, rubber, and non-magnetic material like plastics, adsorption devices, such as a vacuum chuck and an electrostatic chuck, are used for temporary immobilization.

[0025] As for this adsorption device, it is desirable to constitute so that temporary immobilization of an imprint intaglio can be canceled one by one by turning off the switch of a part canceling using the electromagnetic chuck, the vacuum chuck, or the electrostatic chuck into which the field which carries out a chuck was divided.

[0026] It may be made to perform temporary immobilization to the opposed face of an imprint intaglio and support in addition to the above-mentioned adsorption device by using a piece of Velcro and the adhesive weak binder which sticks repeatedly, removes and can \*\*. Or while forming a crevice in a field on the other hand, it may be made to carry out by inserting these in an another side side mutually using the structure of the opposed face of an imprint intaglio and support in which heights were formed. In this case, a crevice and heights may be directly formed in the opposed face of an imprint intaglio and support, and you may make it attach in the opposed face of an imprint intaglio and support the structure of the resin formed beforehand.

[0027] Moreover, the base materials (for example, support plate produced by thin stainless steel Invar material) which have flexibility in an imprint intaglio are attached beforehand, and you may make it support an imprint intaglio by pulling the base material from both ends, and applying a tension.

[0028] As a substrate, substrates, such as glass, a quartz, and silicon, and the substrate in which desired structures, such as an electrode, an insulator layer, a dielectric layer, and a protective coat, were formed on these substrates are contained.

[0029] When support is the plate which has flexibility, as for the alignment (alignment) of an imprint intaglio and a substrate, it is desirable to carry out by maintaining an imprint intaglio in parallel to a substrate, and making a substrate meet. This alignment can be performed by moving and rotating an alignment table horizontally so that the alignment mark of an imprint intaglio and a substrate may be in agreement, after preparing beforehand two or more positioning marks (alignment mark) in the imprint intaglio and the substrate, laying a substrate in the alignment table in which horizontal migration and rotation are possible and carrying out temporary immobilization of the imprint intaglio at support. Coincidence of an alignment mark with an imprint intaglio and a substrate can be correctly performed by expanding an alignment mark and making it agree with a magnifier etc.

[0030] It may be made to perform discharge of sticking by pressure to the substrate of a structural material, and temporary immobilization of an imprint intaglio to coincidence to the other end continuously from the end of an imprint intaglio. Moreover, after the whole imprint intaglio is stuck and stuck to a substrate, you may make it cancel temporary immobilization of an imprint intaglio.

[0031] As for the removal from the substrate of an imprint intaglio, it is desirable to carry out by exfoliating from a substrate so that Peel of the sheet-like imprint intaglio may be carried out from an edge.

[0032] If a spacial configuration object is a septum after removing an imprint intaglio from a substrate and imprinting a spacial configuration object on a substrate, a septum can be formed by calcinating. A firing furnace performs baking. Although a firing environments and temperature change with classes of



a paste or substrate, they are usually calcinated in air or nitrogen-gas-atmosphere. Burning temperature is performed at 500-580 degrees C.

[0033] According to another viewpoint, this invention is the substrate assembly which has the spacial configuration object formed by the above-mentioned spacial configuration object imprint approach, and the plasma display panel manufactured using this substrate assembly.

[0034] The conveyance device in which according to still more nearly another viewpoint two or more slots are arranged, restoration spreading of the paste-like structural material is carried out in a crevice, and this invention conveys hardening or the sheet-like imprint intaglio by which semi-hardening was carried out to extent which can discover adhesiveness. The support for carrying out temporary immobilization of the imprint intaglio conveyed according to the conveyance device, The stage which can perform alignment of an imprint intaglio and a substrate by laying a substrate and moving the location of this substrate in parallel to support, The roll press device which sticks a structural material to a substrate by pressure with an imprint intaglio by pressing an imprint intaglio with a roller from a tooth back after the alignment of an imprint intaglio and a substrate, It is spacial configuration object imprint equipment which comes to have the discharge device in which temporary immobilization of an imprint intaglio is canceled, and the removal device in which an imprint intaglio is removed from a substrate after press of a roll press device.

[0035] As for an imprint intaglio, in this equipment, it is desirable to use for the continuation sheet rolled in the shape of a roll as a roll sheet with which the intaglio was arranged. In this case, while preparing a sprocket in a conveyance device, it is good to establish the sprocket hole for conveyance in the both ends of a roll sheet.

[0036] The support which carries out temporary immobilization of the imprint intaglio can consist of imprint versions with which the plate which a screen is stretched in the frame arranged horizontally, for example, and has flexibility on the screen was supported. When an imprint intaglio is the roll sheet which has a sprocket hole, it is desirable to prepare the pin according to the sprocket hole for PURIARAIMENTO [ support / an imprint intaglio / a position ].

[0037] It is desirable to prepare the adsorption device for carrying out temporary immobilization of the imprint intaglio in support. In that case, as for an adsorption device, it is desirable to constitute from an electromagnetic chuck which can carry out sequential discharge of the temporary immobilization of an imprint intaglio, a vacuum chuck, or an electrostatic chuck by turning off partially the switch of the chuck field divided and prepared.

[0038] It is desirable to prepare the alignment mark for performing both alignment in an imprint intaglio and a substrate. Moreover, it is desirable to prepare in a stage the alignment table [ it is possible to lay a substrate and ] which can move and rotate a substrate horizontally so that the alignment mark of an imprint intaglio and a substrate may be in agreement after temporary immobilization of the imprint intaglio is carried out at support.

[0039] Hereafter, based on the example shown in a drawing, this invention is explained in full detail. In addition, this invention is not limited by this.

[0040] Drawing 1 is the perspective view showing the configuration of PDP equipped with the septum manufactured using the spacial configuration object imprint approach of this invention, and its equipment.

[0041] In drawing, 10 is PDP of 3 electrode-surface discharge mold of AC drive method. PDP10 consists of a substrate 11 by the side of the front face which consists of glass, and a substrate 21 by the side of a tooth back.

[0042] On the medial surface of the substrate 11 by the side of a front face, the Sas Tin electrodes X and Y for field discharge generating are arranged horizontal almost in parallel at every display Rhine L, and the dielectric layer 17 and the protective coat 18 which consists of MgO are formed on it. Since the Sas Tin electrodes X and Y are formed in the substrate by the side of a front face, they are formed with the metal electrode (bus electrode) 13 which consists of a transparent electrode 12 which consists of ITO, and Cr/Cu/Cr.

[0043] The address [ top / of the substrate 21 by the side of a tooth back / medial-surface ] (data)



electrode A of the plurality the substrate layer 22 and for address discharge generating And sequential formation of the dielectric layer 24 is carried out, and many septa (rib) 29 of the shape of a stripe for classifying discharge physically so that the address electrode A may be inserted on it are formed almost perpendicularly (direction which intersects the Sas Tin electrode) in parallel. In the long and slender slot between septa (crevice), the fluorescent substance layers 28R, 28G, and 28B are formed. The arrangement pattern of three colors is a stripe pattern with which the luminescent color of the trains which the luminescent color of the cel of one train is the same, and adjoins differs.

[0044] The neon of a principal component is filled up with the discharge gas which mixed the xenon in discharge space 30 (charged pressure is about 500 Torr(s)), and the fluorescent substance layers 28R, 28G, and 28B are locally excited by the ultraviolet rays which a xenon releases at the time of discharge, and emit light by them.

[0045] Next, how to form a septum 29 using the spacial configuration object imprint approach of this invention and its equipment is explained.

[0046] [Example 1] drawing 2 (A) - drawing 2 (D) and drawing 3 (A) - drawing 3 (C) are the explanatory views showing the example 1 of the spacial configuration object imprint approach in order of a process.

[0047] extent which can discover adhesiveness or an adhesive property at a next sticking-by-pressure process after a septum ingredient packer fills up with the paste-like septum ingredient 2 more nearly first the crevice of the sheet-like imprint intaglio 1 in which the matrix of a septum was formed by spreading -- hardening -- or semi-hardening is carried out (refer to drawing 2 (A)).

[0048] Base material 1a and matrix 1b of a septum are united, and the sheet-like imprint intaglio 1 is produced by the well-known approach using the ingredient of a silicone rubber system. This imprint intaglio 2 is freely turnable at a plane.

[0049] A low-melting-glass paste which contains in a vehicle resin which adhesiveness discovers by irradiating ultraviolet rays after a low-melting-glass paste which contains in a vehicle adhesive resin which adhesiveness discovers after hardening as a paste-like septum ingredient 2, and hardening is used.

[0050] In using a low-melting-glass paste which contains ultraviolet-rays hardening resin in a vehicle, at this time, it changes into the semi-hardening condition of extent which does not carry out ultraviolet curing completely. In addition, in order to secure moderate softness and moderate adhesiveness to a septum ingredient in the state of hardening or semi-hardening, it is desirable to mix a plasticizer and a thickener.

[0051] Temporary immobilization is carried out at support 3 like the imprint version which stuck and stuck the stainless plate which stainless plate 3a was supported by frame 3b by the mesh tension, for example, is supple in the thickness direction in the center section of the screen-stencil version in the imprint intaglio 1 with which it filled up with the septum ingredient 2 in the temporary fixed process, next the crevice of septum correspondence (refer to drawing 2 (B)). In this temporary immobilization, after sticking the septum ingredient 2 to a substrate by pressure with the imprint intaglio 1, the imprint intaglio 1 is temporarily fixed to support 3 so that the imprint intaglio 1 can be released from support 3.

[0052] The adsorption device by the permanent magnet performs this temporary immobilization. That is, the support plate which has the magnetism of a griddle, the Invar plate, etc. is beforehand formed in base material 1a of the imprint intaglio 1, and it carries out using the sheet-like flexible magnet 4 by adsorbing the imprint intaglio 1 over stainless plate 3a of support 3 with this flexible magnet 4.

[0053] You may make it support the imprint intaglio 1 at this process, by attaching beforehand base material (for example, support plate produced by thin stainless steel Invar material) 3c which has flexibility in the imprint intaglio 1, clamping the both ends of that base material 3c using clamp support 4c, pulling in the direction which shows the imprint intaglio 1 by the arrow head K, and adding a tension, as shown in drawing 4.

[0054] Prepare about 1-3mm path clearance, an alignment process, next the support 3 with which temporary immobilization of the imprint intaglio 1 is carried out are made to counter in parallel with a substrate 5, and alignment of the relative position of the imprint intaglio 1 and a substrate 5 is performed

(refer to drawing 2 (C)).

[0055] As drawing 1 showed the substrate 5, the substrate layer 22, the address electrode A, and a dielectric layer 24 are formed on the substrate 21 by the side of a tooth back. In this case, especially the dielectric layer 24 does not need to be formed and you may make it form it in a septum and coincidence by imprint using a septum ingredient, a different ingredient, or the septum ingredient itself.

[0056] The alignment of the imprint intaglio 1 and a substrate 5 prepares two or more alignment marks in the imprint intaglio 1 and the substrate 5 beforehand, lays a substrate 5 in the alignment table 7 in which horizontal migration and rotation are possible, and performs it by moving and rotating the alignment table 7 horizontally so that the alignment mark of the imprint intaglio 1 and a substrate 5 may be in agreement.

[0057] The septum ingredient 2 of the condition with adhesiveness or an adhesive property is stuck to a substrate 5 by pressure with the imprint intaglio 1 by moving a press roller 6 in the direction of an arrow head S, pressing sticking by pressure and a release process, next the imprint intaglio 1 by the press roller 6 through support 3 from a tooth back. When the septum ingredient 2 is an ultraviolet curing ingredient of a semi-hardening condition, ultraviolet rays are partially irradiated from the tooth-back side of a substrate 5, and full hardening of the septum ingredient 2 and adhesion to a substrate 5 are performed.

[0058] In the case of this sticking by pressure, temporary immobilization of the imprint intaglio 1 is continuously canceled of the end of the imprint intaglio 1 to the other end to sticking by pressure and coincidence to the substrate 5 of the septum ingredient 2. That is, it tears off in the direction which shows the flexible magnet 4 on the rear face of an imprint intaglio to sticking by pressure and coincidence by the arrow head R at any time, and the imprint intaglio 1 is released (refer to drawing 2 (D)). By adsorption devices, such as an electromagnetic chuck, a vacuum chuck, and an electrostatic chuck, the imprint intaglio 1 may carry out temporary immobilization, divides beforehand the field which carries out a chuck in that case, and cancels temporary immobilization of the part by turning off the switch of a part to cancel temporary immobilization.

[0059] Thus, the imprint intaglio 1 is released from support 3, sticking and sticking the imprint intaglio 1 on a substrate 5 by canceling the temporary fixed condition over support to a substrate 5 sticking the imprint intaglio 1 by pressure, and the imprint intaglio 1 is placed away (refer to drawing 3 (A)) on a substrate 5.

[0060] What is necessary is just to cancel a clamp after the completion of sticking by pressure, when the imprint intaglio 1 is supported clamping the both ends of the imprint intaglio 1 by clamp support 4c, and applying a tension, as drawing 4 showed.

[0061] The imprint intaglio 1 is removed from a substrate 5 after sticking by pressure of the mold release process imprint intaglio 1 by exfoliating from a substrate 5 so that Peel of the imprint intaglio 1 may be carried out, as an arrow head P shows (refer to drawing 3 (B)). As for the Peel include angle at this time, it is desirable to exfoliate, while about 90 degrees is desirable and rolls a support roll on the top face of the imprint intaglio 1. Thus, the imprint intaglio 1 is altogether exfoliated from a substrate 5, and the imprint of a septum ingredient is completed (refer to drawing 3 (C)). And a septum is formed by performing baking after that.

[0062] [Example 2] drawing 5 (A) - drawing 5 (C) are the explanatory views showing the example 2 of the spacial configuration object imprint approach.

[0063] Since a septum ingredient packer is the same about a temporary fixed process, an alignment process, and a mold release process as compared with the above-mentioned example 1, this example explains only sticking by pressure and a release process.

[0064] Temporary immobilization in support is not canceled, sticking the imprint intaglio 1 to a substrate by pressure, but after sticking and sticking the whole imprint intaglio 1 to a substrate 5, you may make it cancel temporary immobilization of the imprint intaglio 1, when the path clearance of the imprint intaglio 1 and a substrate 5 can hold small enough after the alignment process of the above-mentioned example 1 and the force with the imprint intaglio 1 impossible for is not added.

[0065] Namely, the septum ingredient 2 is stuck to a substrate 5 by pressure with the imprint intaglio 1 (refer to drawing 5 (A)). By tearing off in the direction which shows a flexible magnet 4 by the arrow

head R from the rear face of the imprint intaglio 1, after [ the substrate 5 of the imprint intaglio 1 ] sticking, wearing and carrying out injury termination (refer to drawing 5 (B)), as temporary immobilization is canceled by package and an arrow head S shows it, the imprint intaglio 1 is released and it places away (refer to drawing 5 (C)) on a substrate 5.

[0066] In addition, what is necessary is just to cancel a clamp after the completion of sticking by pressure like an example 1, when the both ends of the imprint intaglio 1 are clamped by clamp support 4c, a tension is added and the imprint intaglio 1 is supported, as drawing 4 showed. About a subsequent mold release process, it is the same as that of an example 1.

[0067] [Example 3] drawing 6 (A) - drawing 6 (D) are the explanatory views showing the example 3 of the spacial configuration object imprint approach.

[0068] This example is an example which uses roll-like support instead of plane support. That is, in this example, temporary immobilization of the imprint intaglio with which it filled up with the septum ingredient is carried out at a roll-like imprint fixture, temporary immobilization is canceled like examples 1 and 2, sticking an imprint intaglio to a substrate by pressure, and Peel exfoliation is carried out after that.

[0069] First, after carrying out restoration spreading of the paste-like septum ingredient, hardening or the roll sheet 31 which was made to carry out semi-hardening and was involved in in the shape of a roll is prepared for a sheet-like imprint intaglio. And the imprint intaglio 1 is pulled out from the roll sheet 31, and the roll-like imprint fixture (lamination roll) 33 which possesses the adsorption devices 32, such as an electromagnetic chuck into which the chuck field was divided, an electrostatic chuck, and a vacuum chuck, inside is sent with the delivery roll 34 of a pair (refer to drawing 6 (A)).

[0070] Next, twisting the sent imprint intaglio 1 around the roll-like imprint fixture 33, by the conveyance gear 35, specified quantity conveyance is carried out and temporary immobilization is carried out (refer to drawing 6 (B)). In case [ this ] it twists, it twists carrying out alignment so that the imprint intaglio 1 may come to a position to the roll-like imprint fixture 33. It twists and the rest cuts the roll sheet 31 by the cutter 36 (mold fix cut).

[0071] The roll sheet 31 may arrange the imprint intaglio for one panel at fixed spacing on paper or the continuation sheet made of resin, and may arrange an imprint intaglio by the successive state.

[0072] The sprocket hole has opened in the both ends of the roll sheet 31, it is used in the case of conveyance of the roll sheet 31, and also this sprocket hole is used as PURIARAIMENTO at the time of carrying out temporary immobilization of the roll sheet 31 at the roll-like imprint fixture 33, and an alignment device with a substrate.

[0073] Next, after the imprint intaglio 1 carries out alignment of the roll-like imprint fixture 33 by which temporary immobilization is carried out to a substrate 5, the roll-like imprint fixture 33 is pressed against a substrate 5, and temporary immobilization is serially canceled by turning off the switch of the chuck field of the adsorption device 32 one by one, sticking the septum ingredient 2 to a substrate 5 by pressure with the imprint intaglio 1. That is, temporary immobilization is released from the completed part which is stuck and stuck one by one (refer to drawing 6 (C)).

[0074] Thus, after sticking and sticking the imprint intaglio 1 to a substrate 5, Peel exfoliation of the imprint intaglio 1 is carried out, and the septum ingredient 2 is imprinted (refer to drawing 6 (D)). It is the same as that of an example 1 about this mold release process or later.

[0075] Drawing 7 is the explanatory view showing the outline of an example of the equipment for producing the roll sheet 31 of an imprint intaglio. This example is an example which produces the roll sheet 31 which filled up the imprint intaglio with the septum ingredient. As a septum ingredient, even if there is no solvent evaporation, very few ingredients are used. For example, a low-melting-glass paste which contains in a vehicle the resin which adhesiveness discovers by irradiating ultraviolet rays after hardening, and a low-melting-glass paste which contains ultraviolet-rays hardening resin in a vehicle are used.

[0076] After filling up with this equipment so that the imprint intaglio sheet 41 wound around one roll and the cover sheet 42 wound around the roll of another side are doubled with rollers 43 and 44, a die 45 may be used in case [ that ] it doubles, and the septum ingredient 2 may be put among both sheets,

moderate ultraviolet rays are irradiated with a black light 46, semi-hardening is carried out and the roll sheet 31 is produced for the septum ingredient 2 by hardening or rolling it round.

[0077] In case the imprint intaglio with which it filled up with the septum ingredient 2 is used for an imprint, a cover sheet 42 is removed beforehand and housekeeping of examples 1-3 performs imprint formation.

[0078] Drawing 8 is the explanatory view showing the outline of other examples of the equipment for producing the roll sheet 31 of an imprint intaglio. In this example, a low-melting-glass paste which contains in a vehicle adhesive resin which adhesiveness discovers after hardening as a septum ingredient is used.

[0079] With this equipment, the roll sheet 31 is produced by using the lip coater 48 for a web 47 delivery and here, and a cover sheet 42 covering the imprint intaglio sheet 41 wound around the roll through desiccation hardening by the heater 49 or the drying furnace after filling up an imprint intaglio with the septum ingredient 2 if needed, and rolling it round. The lip coater 48 is an example and may use other coat equipments, such as slit coater.

[0080] Drawing 9 is the explanatory view showing the spacial configuration object imprint equipment for realizing the approach shown in the example 1. In this drawing, the imprint intaglio sheet with which 51 was filled up with the septum ingredient, and 52, 53, 54, 55, 56 and 57 A roller, 58 rolls round a press roller and a sprocket conveyance device and 60 roll round 59. A roll, 61 winds. The support for temporary immobilization and 63 the guide rail of a \*\* roll, and 62 A substrate, It is the alignment mark for alignment by which the alignment table on which 64 had been arranged on the stage and 65 has been arranged on a stage, and 66 were prepared in the camera for alignment, and 67 was prepared in the imprint intaglio sheet 51 and the substrate 63, respectively.

[0081] The roller 57 has the function as a sheet tension buffer. The rolling-up roll 60 is movable in the direction shown by the arrow head U, moves to the method of drawing Nakagami along with a guide rail 61 at the time of mold release, and rolls round the imprint intaglio sheet which rotates in the direction shown by the arrow head T, and does not have a septum ingredient after an imprint.

[0082] The sprocket hole has opened in the both ends of the imprint intaglio sheet 51, and this sprocket hole is used in the case of conveyance of the imprint intaglio sheet 51. Moreover, PURIARAIMENTO [ now / the pin corresponding to a sprocket hole is prepared in support 62, and / with a sprocket hole and a pin / the imprint intaglio sheet 51 / the position of support 62 ]. The sprocket hole of the imprint intaglio sheet 51 is used also as an alignment device with a substrate 63.

[0083] The stage 64 is movable in the direction shown by the arrow head V, and it moves in the direction of drawing Nakamigi on it at the time of mold release. The alignment table 65 consists of X table 65a movable in the direction of X, Y table 65b movable in the direction of Y, and pivotable rotary table 65c.

[0084] Alignment of the imprint intaglio sheet 51 and a substrate 63 is performed by doubling the location of the alignment mark 67 with the camera 66 for alignment. Although not illustrated, the interior of the adsorption devices, such as an electromagnetic chuck for carrying out temporary immobilization of the imprint intaglio sheet 51, an electrostatic chuck, and a vacuum chuck, is carried out to support 62. The field which carries out a chuck divides, and is prepared and this adsorption device carries out sequential discharge of the temporary immobilization of the imprint intaglio sheet 51 by turning off partially the switch of this chuck field divided and prepared.

[0085] In addition, an imprint version like the screen-stencil version shown in the example 1 may be used for support 62. Moreover, when dimensional accuracy is permitted also by the sheet independent tension, you may make it support the imprint intaglio sheet 51, applying a tension, as drawing 4 showed.

[0086] Drawing 10 (A), drawing 10 (B), and drawing 10 (C) are the explanatory views showing actuation of the spacial configuration object imprint equipment shown by drawing 9 , and show the example for performing imprint formation of a septum continuously.

[0087] First, the imprint intaglio sheet 51 is rolled round and a desired imprint intaglio is moved to the location of support 62. And temporary immobilization of the imprint intaglio is carried out by the

adsorption device at support 62, a substrate 63 is moved on the alignment table 65, and alignment of an imprint intaglio and a substrate 63 is performed (refer to drawing 10 (A)).

[0088] Next, sequential discharge of the temporary immobilization of an imprint intaglio is carried out according to an adsorption device at coincidence, sticking a septum ingredient by pressure by carrying out a roll press in the direction shown by the arrow head L by the press roller 58 (refer to drawing 10 (B)).

[0089] Next, it exfoliates from a substrate 63 by raising a press roller 58, making it move leftward in drawing, making it move in the direction which shows the location of the rolling-up roll 60 by the arrow head M, rolling round the imprint intaglio sheet 51, making it synchronize with migration of the imprint intaglio sheet 51, and moving a stage 64 in the direction of an arrow head N so that Peel may be carried out in the direction which shows an imprint intaglio by the arrow head P (refer to drawing 10 (C)).

[0090] Thus, the limit about the adhesion reinforcement of a structural material, or mechanical strength and extent of the mold-release characteristic of an imprint intaglio can be made to ease sharply using a sheet-like imprint intaglio by being stuck by pressure by carrying out temporary immobilization of the imprint intaglio at support, and enabling it to perform Peel exfoliation using the sheet nature of an imprint intaglio in the case of mold release of an imprint intaglio in the case of sticking by pressure of a septum ingredient.

[0091]

[Effect of the Invention] According to this invention, the process of an imprint is divided into two processes of a sticking-by-pressure process and a mold release process. At a mold release process Since it enabled it to perform Peel exfoliation which the force with the mold release impossible for does not join While the imprint precision by imprint formation of the spacial configuration object using an imprint intaglio improves, and also the conditions of the adhesion reinforcement and the mold-release characteristic which are required of a structural material or the ingredient of an imprint intaglio can be eased and the degree of freedom of ingredient selectivity spreads, Field of application of this technique also spreads.

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[Translation done.]

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the configuration of PDP manufactured using the spacial configuration object imprint approach of this invention, and its' equipment.

[Drawing 2] It is the explanatory view showing the example 1 of the spacial configuration object imprint approach in order of a process.

[Drawing 3] It is the explanatory view showing the example 1 of the spacial configuration object imprint approach in order of a process.

[Drawing 4] It is the explanatory view showing the condition of having supported the imprint intaglio using clamp support.

[Drawing 5] It is the explanatory view showing the example 2 of the spacial configuration object imprint approach.

[Drawing 6] It is the explanatory view showing the example 3 of the spacial configuration object imprint approach.

[Drawing 7] It is the explanatory view showing the outline of an example of the equipment for producing the roll sheet of an imprint intaglio.

[Drawing 8] It is the explanatory view showing the outline of other examples of the equipment for producing the roll sheet of an imprint intaglio.

[Drawing 9] It is the explanatory view showing the spacial configuration object imprint equipment for realizing the approach shown in the example 1.

[Drawing 10] It is the explanatory view showing actuation of the spacial configuration object imprint equipment shown by drawing 9.

[Description of Notations]

1 Imprint Intaglio

1a Base material

1b The matrix of a septum

2 Septum Ingredient

3 62 Support

3a Stainless plate

3b Frame

4 Flexible Magnet

5 63 Substrate

6 Press Roller

7 65 Alignment table

10 PDP of 3 Electrode-Surface Discharge Mold of AC Drive Method

11 Substrate by the side of Front Face

12 Transparent Electrode

13 Metal Electrode (Bus Electrode)

17 Dielectric Layer

18 Protective Coat  
21 Substrate by the side of Tooth Back  
22 Substrate Layer  
24 Dielectric Layer  
28R, 28G, 28B Fluorescent substance layer  
29 Septum  
30 Discharge Space  
31 Roll Sheet  
32 Adsorption Device  
33 Roll-like Imprint Fixture  
34 Delivery Roll  
35 Conveyance Gear  
36 Cutter  
41 Imprint Intaglio Sheet  
42 Cover Sheet  
43 44 Roller  
45 Die  
46 Black Light  
47 Web  
48 Lip Coater  
49 Heater  
51 Imprint Intaglio Sheet  
52, 53, 54, 55, 56, 57 Roller  
58 Press Roller  
59 Sprocket Conveyance Device  
60 Rolling-Up Roll  
61 Guide Rail  
64 Stage  
66 Camera for Alignment  
67 Alignment Mark  
A Address electrode  
L Display Rhine  
X, Y The Sas Tin electrode

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[Translation done.]



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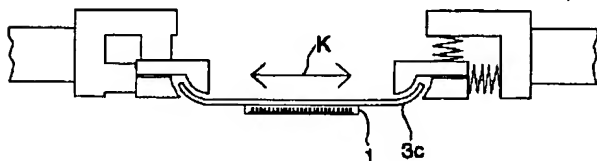
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DRAWINGS

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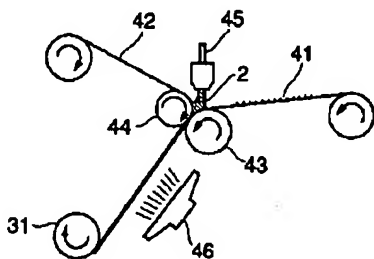
[Drawing 4]

クランプ支持具を用いて転写凹版を支持した状態を示す説明図



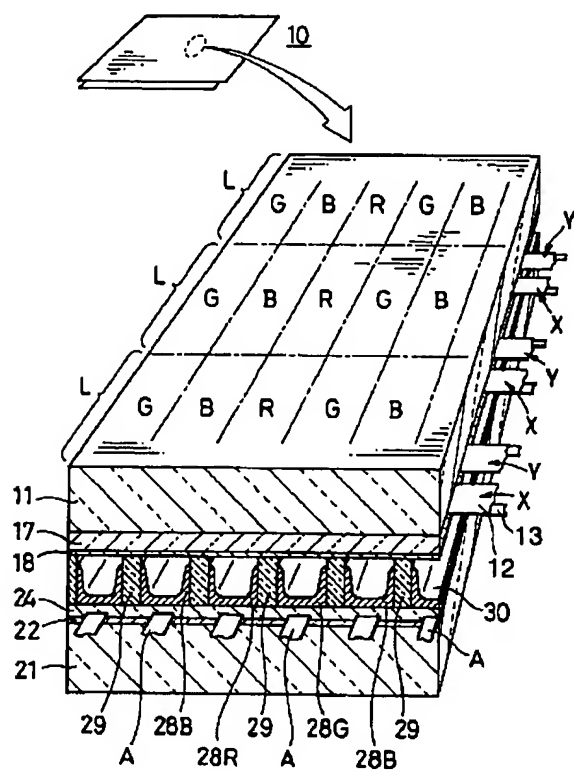
[Drawing 7]

転写凹版のロールシートを作製するための装置の一例の概要を示す説明図



[Drawing 1]

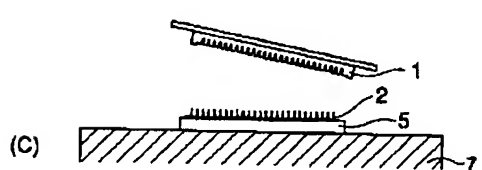
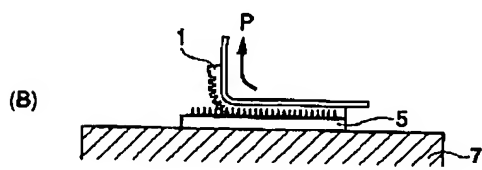
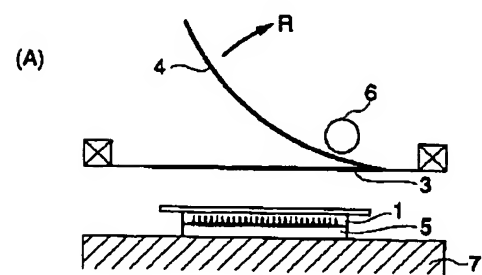
本発明の立体構造物転写方法及びその装置を用いて製造される  
PDPの構成を示す斜視図



[Drawing 2]

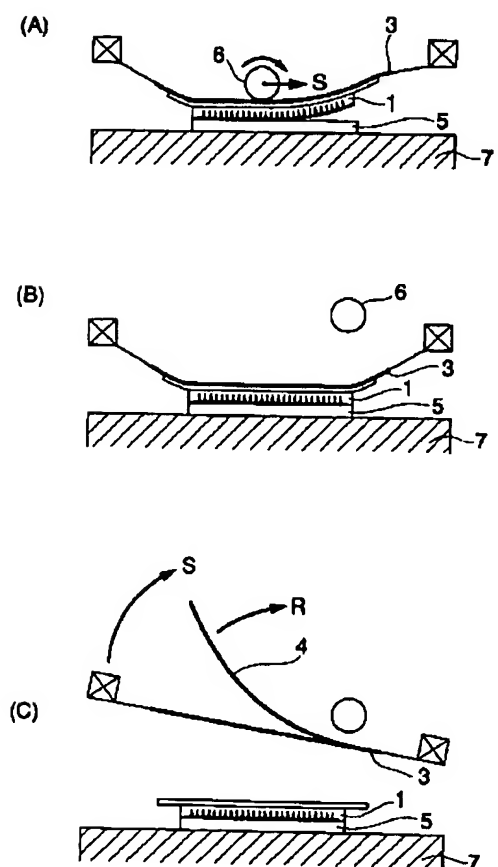


立体構造物転写方法の実施例1を工程順に示す説明図



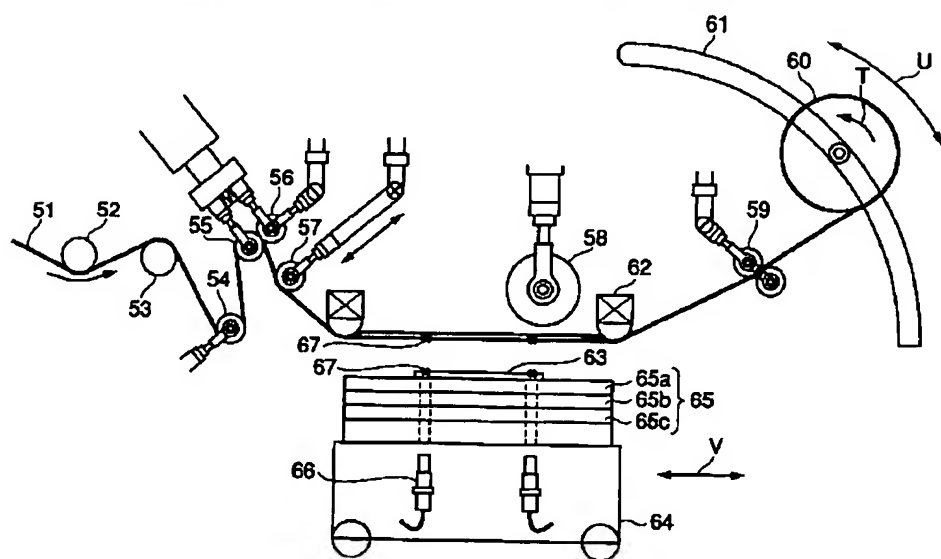
[Drawing 5]

立体構造物転写方法の実施例2を示す説明図



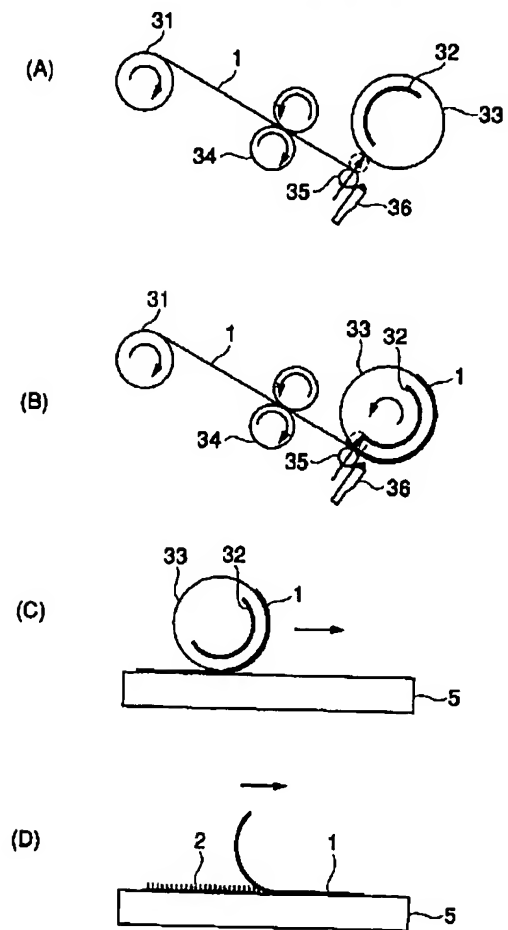
[Drawing 9]

実施例1で示した方法を実現するための立体構造物転写装置を示す説明図



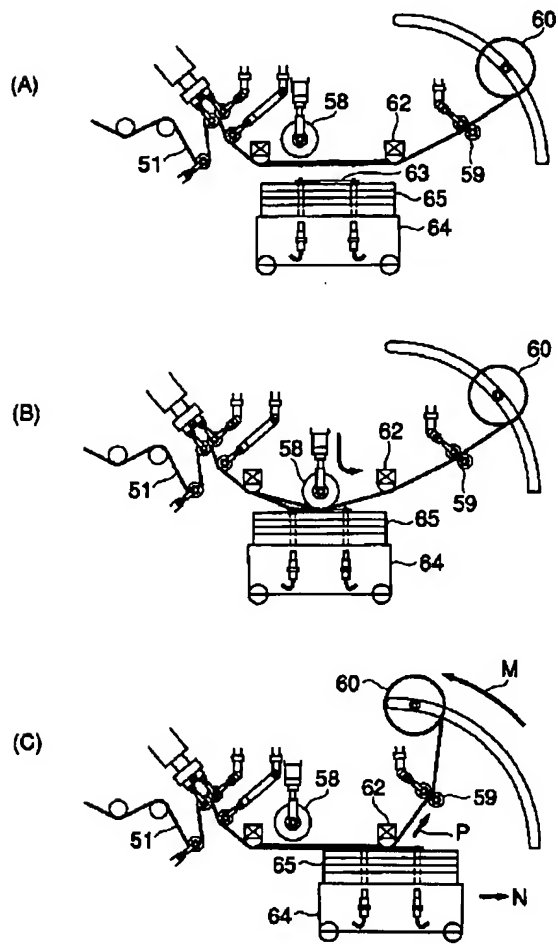
[Drawing 6]

立体構造物転写方法の実施例3を示す説明図



[Drawing 10]

図9で示した立体構造物転写装置の動作を示す説明図



[Translation done.]